

**GEORASTER PHYSICAL DATA MODEL FOR STORING
GEOREFERENCED RASTER DATA**

CLAIMS

What is claimed is:

- 1 1. In a database management system, a system for handling geographic raster
2 data comprising:
 - 3 a first data table including a plurality of GeoRaster objects, each
4 GeoRaster object including a spatial extent geometry and associated metadata,
5 the spatial extent geometry identifying a footprint of a geographic raster data
6 object and associated with at least one block of raster data;
 - 7 a second data table including a plurality of raster objects, each raster
8 object associated with one block of raster data of a GeoRaster object and
9 including information indicating a spatial extent of the block of raster data and
10 information relating to the block of raster data;
 - 11 a first spatial index built on the first data table based on the spatial extent
12 geometry of each of the plurality of GeoRaster objects, the first spatial index
13 operable to retrieve a GeoRaster object from the first data table based on a
14 relative spatial location of the GeoRaster object; and
 - 15 a primary key index built on the second data table based on the
16 information relating to the block of raster data, the index operable to retrieve a

17 raster object from the second data table based on the information relating to the
18 block of raster data associated with the retrieved raster object.

1 2. The system of claim 1, wherein each GeoRaster object further comprises
2 raster type information indicating a number of spatial dimensions of the
3 GeoRaster object and band or layer information of the GeoRaster object.

1 3. The system of claim 2, wherein each GeoRaster object further comprises
2 information identifying the second data table for each block of raster data in the
3 GeoRaster object.

1 4. The system of claim 3, wherein each GeoRaster object further comprises
2 information identifying a raster object in the second data table for each block of
3 raster data in the GeoRaster object.

1 5. The system of claim 4, wherein each raster object further comprises
2 information matching information identifying a raster object in the second data
3 table in a GeoRaster object.

1 6. The system of claim 5, wherein each raster object further comprises
2 information indicating a resolution of raster data associated with the raster object.

1 7. The system of claim 6, wherein each raster object further comprises
2 information identifying a block of raster data associated with the raster object.

1 8. The system of claim 7, wherein the associated metadata comprises object
2 metadata including object description information and object version
3 information, raster metadata including cell depth information, dimensionality
4 information, blocking information, and interleaving information.

1 9. The system of claim 8, wherein the associated metadata further comprises
2 spatial reference system information relating to a polynomial transformation for
3 georeferencing.

1 10. The system of claim 9, wherein the polynomial transformation is an
2 affine transformation.

1 11. The system of claim 10, wherein the associated metadata further
2 comprises information relating to layers in a GeoRaster object.

1 12. The system of claim 11, wherein the associated metadata further
2 comprises image/cell attribution information, scaling factor information, color
3 related information, and layer-based attribute information for each layer.

1 13. The system of claim 12, wherein the first spatial index comprises an R-
2 Tree index.

1 14. The system of claim 13, wherein the second index comprises a B-Tree
2 index.

1 15. The system of claim 1, further comprising
2 a second spatial index built on the second data table based on the
3 information indicating a spatial extent of the block of raster data of each of the
4 plurality of raster data objects, the second spatial index operable to retrieve a
5 raster object from the second data table based on a relative spatial location of a
6 block of raster data associated with the retrieved raster object.

1 16. The system of claim 15, wherein the second spatial index comprises a R-
2 Tree index.

1 17. The system of claim 15, further comprising a trigger operable to perform
2 an action after a data manipulation language operation affecting a GeoRaster
3 object.

1 18. The system of claim 17, wherein the data manipulation language
2 operation comprises at least one of inserting a row, updating the GeoRaster
3 object, and deleting a row.

1 19. The system of claim 15, further comprising a system data table operable
2 to maintain a relationship between the first data table and the second data table.

1 20. The system of claim 19, further comprising a trigger operable to maintain
2 the system data table and GeoRaster object integrity after a data definition
3 language operation is performed on the first data table.

1 21. The system of claim 20, wherein the data definition language operation
2 comprises at least one of a drop operation and a truncate operation.

1 22. In a database management system, a method of workflow for handling
2 geographic raster data comprising the steps of:
3 creating, initializing, and validating a first data table including a plurality
4 of GeoRaster objects, each GeoRaster object including a spatial extent geometry
5 and associated metadata, the spatial extent geometry identifying a footprint of a
6 geographic raster data object and associated with at least one block of raster data;
7 creating a second data table including a plurality of raster objects, each
8 raster object associated with one block of raster data of a GeoRaster object and
9 including information indicating a spatial extent of the block of raster data and
10 information relating to the block of raster data;
11 creating a first spatial index built on the first data table based on the spatial
12 extent geometry of each of the plurality of GeoRaster objects, the first spatial
13 index operable to retrieve a GeoRaster object from the first data table based on a
14 relative spatial location of the GeoRaster object; and
15 creating a primary key index built on the second data table based on the
16 information relating to the block of raster data, the index operable to retrieve a
17 raster object from the second data table based on the information relating to the
18 block of raster data associated with the retrieved raster object.

1 23. The method of claim 22, wherein each GeoRaster object further comprises
2 raster type information indicating a number of spatial dimensions of the
3 GeoRaster object and band or layer information of the GeoRaster object.

1 24. The method of claim 23, wherein each GeoRaster object further comprises
2 information identifying the second data table for each block of raster data in the
3 GeoRaster object.

1 25. The method of claim 24, wherein each GeoRaster object further comprises
2 information identifying a raster object in the second data table for each block of
3 raster data in the GeoRaster object.

1 26. The method of claim 25, wherein each raster object further comprises
2 information matching information identifying a raster object in the second data
3 table in a GeoRaster object.

1 27. The method of claim 26, wherein each raster object further comprises
2 information indicating a resolution of raster data associated with the raster object.

1 28. The method of claim 27, wherein each raster object further comprises
2 information identifying a block of raster data associated with the raster object.

1 29. The method of claim 28, further comprising the step of:
2 changing a format of the first data table.

1 30. The method of claim 28, further comprising the step of:
2 querying and/or updating metadata associated with a GeoRaster object.

1 31. The method of claim 28, further comprising the step of:
2 processing at least some of the plurality of GeoRaster objects.

1 32. The method of claim 28, further comprising the step of:
2 exporting at least some of the plurality of GeoRaster objects.

1 33. The method of claim 28, further comprising the step of:
2 viewing at least some of the plurality of GeoRaster objects.

1 34. The method of claim 24, further comprising the step of:
2 creating a second spatial index built on the second data table based on the
3 information indicating a spatial extent of the block of raster data of each of the
4 plurality of raster data objects, the second spatial index operable to retrieve a
5 raster object from the second data table based on a relative spatial location of a
6 block of raster data associated with the retrieved raster object.

1 35. The method of claim 34, wherein the second spatial index comprises a R-
2 Tree index.

1 36. The method of claim 34, further comprising operating a trigger to perform
2 an action after a data manipulation language operation affecting a GeoRaster
3 object.

1 37. The method of claim 36, wherein the data manipulation language
2 operation comprises at least one of inserting a row, updating the GeoRaster
3 object, and deleting a row.

1 38. The method of claim 34, further comprising creating a system data table
2 operable to maintain a relationship between the first data table and the second
3 data table.

1 39. The method of claim 38, further comprising operating a trigger to
2 maintain the system data table and GeoRaster object integrity after a data
3 definition language operation is performed on the first data table.

1 40. The method of claim 39, wherein the data definition language operation
2 comprises at least one of a drop operation and a truncate operation.